

WHAT IS CLAIMED IS:

1. A method of manufacturing a perpendicular magnetic recording medium, comprising forming on a nonmagnetic substrate a magnetic layer at 280 to 5 450°C by using a magnetic layer-forming material containing at least one additive component selected from the group consisting of cobalt, platinum, molybdenum and tungsten, said magnetic layer being constructed to include a plurality of magnetic crystal 10 grains separated from each other by crystal grain boundaries and providing a perpendicular magnetic layer in which the additive component is segregated in the crystal grain boundaries.

2. The method of manufacturing a perpendicular magnetic recording medium according to claim 1, 15 wherein the perpendicular magnetic layer is formed at 300°C to 400°C on the nonmagnetic substrate.

3. The method of manufacturing a perpendicular magnetic recording medium according to claim 1, 20 further comprising forming at least one underlayer having a hexagonal close-packed structure on the nonmagnetic substrate before the step of forming the perpendicular magnetic layer.

4. The method of manufacturing a perpendicular magnetic recording medium according to claim 3, 25 wherein forming the underlayer comprises forming a second underlayer containing at least one element

selected from the group consisting of nickel, niobium, tantalum, aluminum, tungsten, cobalt, carbon and titanium, and forming on the second underlayer a first underlayer containing at least one element selected
5 from the group consisting of titanium, ruthenium, chromium, hafnium, cobalt, platinum, boron, copper, tantalum, molybdenum and tungsten.

5. The method of manufacturing a perpendicular magnetic recording medium according to claim 3,
10 further comprising forming a soft magnetic backing layer before forming the underlayer.

6. The method of manufacturing a perpendicular magnetic recording medium according to claim 3, further comprising forming a cobalt-chromium series
15 perpendicular recording layer after forming of the perpendicular magnetic film and before forming of the underlayer.

7. A perpendicular magnetic recording medium, comprising:
20 a nonmagnetic substrate; and
a perpendicular magnetic layer containing at least one additive component selected from the group consisting of cobalt, platinum, molybdenum and tungsten, formed at 280 to 450°C on the nonmagnetic
25 substrate, and constructed to include a plurality of magnetic crystal grains separated from each other by crystal grain boundaries, the additive component being

segregated in the crystal grain boundaries in the perpendicular magnetic layer.

8. The perpendicular magnetic recording medium according to claim 7, wherein the perpendicular
5 magnetic recording layer contains chromium in an amount of 5 to 20 atomic %.

9. The perpendicular magnetic recording medium according to claim 7, wherein the perpendicular
10 magnetic recording layer contains the molybdenum in an amount of 5 to 20 atomic %.

10. The perpendicular magnetic recording medium according to claim 7, wherein the perpendicular
magnetic recording layer contains the tungsten in an amount of 5 to 15 atomic %.

15 11. The perpendicular magnetic recording medium according to claim 7, wherein the perpendicular
magnetic layer is formed at 300°C to 400°C on the nonmagnetic substrate.

20 12. The perpendicular magnetic recording medium according to claim 7, further comprising at least one
underlayer having a hexagonal close-packed structure and interposed between the nonmagnetic substrate and
the perpendicular magnetic layer.

25 13. The perpendicular magnetic recording medium according to claim 12, wherein the underlayer contains
at least one element selected from the group consisting of cobalt, chromium and platinum.

14. The perpendicular magnetic recording medium according to claim 13, wherein the underlayer further contains at least one element selected from the group consisting of boron, tantalum, ruthenium and oxygen.

5 15. The perpendicular magnetic recording medium according to claim 12, wherein the underlayer includes a first underlayer containing at least one element selected from the group consisting of titanium, ruthenium, chromium, hafnium, cobalt, platinum,
10 boron, copper, tantalum, molybdenum and tungsten, and a second underlayer formed on the side of the nonmagnetic substrate relative to the first underlayer and containing at least one element selected from the group consisting of nickel, niobium, tantalum,
15 aluminum, tungsten, cobalt, carbon and titanium.

16. The perpendicular magnetic recording medium according to claim 15, wherein the second underlayer contains at least one material selected from the group consisting of NiNb, NiTa, NiAl, NiW, NiTaW, and NiTaC.

20 17. The perpendicular magnetic recording medium according to claim 7, further comprising at least one cobalt-chromium series perpendicular recording layer that is interposed between the underlayer and the perpendicular magnetic layer.

25 18. The perpendicular magnetic recording medium according to claim 7, further comprising a soft magnetic backing layer that is interposed between

the underlayer and the nonmagnetic substrate.

19. A magnetic recording-reproducing apparatus,
comprising:

the perpendicular magnetic recording medium
5 comprising a nonmagnetic substrate, and a perpen-
dicular magnetic layer containing at least one
additive component selected from the group consisting
of cobalt, platinum, molybdenum and tungsten, formed
at 280 to 450°C on the nonmagnetic substrate, and
10 constructed to include a plurality of magnetic crystal
grains separated from each other by crystal grain
boundaries, the additive component being segregated in
the crystal grain boundaries in the perpendicular
magnetic layer;

15 a mechanism for supporting and rotating the
perpendicular magnetic recording medium;

a magnetic head including an element for
recording information in the perpendicular magnetic
recording medium and another element for reproducing
20 the recorded information; and

a carriage assembly supporting the magnetic head
such that the magnetic head is movable relative to the
perpendicular magnetic recording medium.

20. The magnetic recording-reproducing apparatus
25 according to claim 19, wherein the magnetic head is
a mono-magnetic pole head.